

CLAIMS

What is claimed is:

- 1 1. A method comprising:
 - 2 connecting a transmitter to a transmission line;
 - 3 receiving an input signal; and
 - 4 transmitting the input signal on the transmission line by switching between a first
 - 5 power source and a second power source to generate a balanced current
 - 6 signal.
- 1 2. The method of claim 1, wherein the balanced current signal comprises a positive
- 2 domain image and a negative domain image and wherein the negative domain
- 3 image is inverted from the positive domain image.
- 1 3. The method of claim 1, wherein the transmission line is a twisted pair cable.
- 1 4. The method of claim 1, wherein the input signal is a digital signal.
- 1 5. The method of claim 1, wherein the first power source is comprised of a direct
- 2 current voltage source.
- 1 6. The method of claim 5, wherein the second power source is comprised of a
- 2 sinusoidal waveform generator and the direct current voltage source.
- 1 7. The method of claim 6, wherein the sinusoidal waveform generator includes a
- 2 direct current voltage offset.
- 1 8. A method comprising:

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- 2 connecting a receiver to a transmission line;
- 3 detecting a balanced current signal on the transmission line by sensing a change in
- 4 a current flowing through the transmission line.
- 1 9. The method of claim 8, wherein the balanced current signal is received as a
- 2 positive domain signal image and a negative domain signal image.
- 1 10. The method of claim 8, wherein the transmission line is a twisted pair cable.
- 1 11. The method of claim 8, wherein the change in current is detected by sensing a
- 2 change in a magnetic field surrounding the transmission line.
- 1 12. The method of claim 11, wherein the change in the magnetic field surrounding the
- 2 transmission line is detected using a magnetic field sensor that includes giant
- 3 magnetoresistive materials.
- 1 13. The method of claim 8, further comprising:
2 determining that the transmission line is active if current flow is detected through
3 the transmission line.
- 1 14. The method of claim 7, further comprising:
2 determining that the transmission line is inactive if no current flow is detected
3 through the transmission line.
- 1 15. A method comprising:
2 connecting a transceiver to a transmission line;
3 obtaining an input signal;

4 transmitting the input signal on the transmission line by switching between a first
5 power source and a second power source to generate a balanced current
6 signal; and
7 detecting the balanced current signal on the transmission line by sensing a change
8 in a current flowing through the transmission line.

- 1 16. The method of claim 15, wherein the balanced current signal comprises a positive
2 domain image and a negative domain image and wherein the negative domain
3 image is inverted from the positive domain image.
- 1 17. The method of claim 15, wherein the transmission line is a twisted pair cable.
- 1 18. The method of claim 15, wherein the input signal is a digital signal.
- 1 19. The method of claim 15, wherein the first power source is comprised of a direct
2 current voltage source.
- 1 20. The method of claim 19, wherein the second power source is comprised of a
2 sinusoidal waveform generator and the direct current voltage source.
- 1 21. The method of claim 20, wherein the sinusoidal waveform generator includes a
2 direct current voltage offset.
- 1 22. The method of claim 15, wherein the change in current is detected by sensing a
2 change in a magnetic field surrounding the transmission line.

- 1 23. The method of claim 22, wherein the change in the magnetic field surrounding the
2 transmission line is detected using a magnetic field sensor that includes giant
3 magnetoresistive materials.
- 1 24. The method of claim 15, further comprising:
2 determining that the transmission line is active if current flow is detected through
3 the transmission line.
- 1 25. The method of claim 15, further comprising:
2 determining that the transmission line is inactive if no current flow is detected
3 through the transmission line.
- 1 26. A transmitter comprising:
2 a connection to a transmission line;
3 a plurality of power sources; and
4 a switch, wherein the switch is coupled to the plurality of power sources and
5 wherein the switch generates a balanced current signal by switching
6 between the plurality of power sources.
- 1 27. The transmitter of claim 26, wherein the balanced current signal comprises a
2 positive domain image and a negative domain image and wherein the negative
3 domain image is inverted from the positive domain image.
- 1 28. The transmitter of claim 26, wherein the transmission line is a twisted pair cable.

1 29. The transmitter of claim 26, wherein the plurality of power sources is comprised
2 of a first power source and a second power source.

1 30. The transmitter of claim 29, wherein the first power source is comprised of a
2 direct current voltage source.

1 31. The transmitter of claim 30, wherein the second power source is comprised of a
2 sinusoidal waveform generator and the direct current voltage source.

1 32. The transmitter of claim 31, wherein the sinusoidal waveform generator includes
2 a direct current voltage offset.

1 33. A receiver comprising:
2 a connection to a transmission line;
3 a current detector, wherein the current detector detects a balanced current signal
4 by sensing a change in a current in the transmission line.

1 34. The receiver of claim 33, further comprising an amplifier to increase the
2 amplitude of the balanced current signal prior to detection by the current detector.

1 35. The receiver of claim 33, wherein the balanced current signal is received as a
2 positive domain signal image and a negative domain signal image.

1 36. The receiver of claim 33, wherein the transmission line is a twisted pair cable.

1 37. The receiver of claim 33, wherein the current detector detects the balanced current
2 signal by sensing a change in a magnetic field surrounding the transmission line.

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- 1 38. The receiver of claim 37, wherein the current detector is a magnetic field sensor
2 that includes giant magnetoresistive materials.
- 1 39. The receiver of claim 33, wherein the receiver determines that the transmission
2 line is active if current flow is detected through the transmission line.
- 1 40. The receiver of claim 33, wherein the receiver determines that the transmission
2 line is inactive if no current flow is detected through the transmission line.
- 1 41. A transceiver comprising:
2 a connection to a transmission line;
3 a transmitter comprising:
4 a plurality of power sources, and
5 a switch, wherein the switch is coupled to the plurality of power sources
6 and wherein the switch generates a first balanced current signal by
7 switching between the plurality of power sources; and
8 a receiver comprising:
9 a current detector, wherein the current detector detects a second balanced
10 current signal by sensing a change in current.
- 1 42. The transceiver of claim 41, wherein the first and second balanced current signals
2 comprise a positive domain image and a negative domain image and wherein the
3 negative domain image is inverted from the positive domain image.
- 1 43. The transceiver of claim 41, wherein the transmission line is a twisted pair cable.

- 1 44. The transceiver of claim 41, wherein the plurality of power sources is comprised
2 of a first power source and a second power source.
- 1 45. The transceiver of claim 44, wherein the first power source is comprised of a
2 direct current voltage source.
- 1 46. The transceiver of claim 45, wherein the second power source is comprised of a
2 sinusoidal waveform generator and the direct current voltage source.
- 1 47. The transceiver of claim 46, wherein the sinusoidal waveform generator includes
2 a direct current voltage offset.
- 1 48. The transceiver of claim 41, wherein the receiver further comprises an amplifier
2 to increase the amplitude of the second balanced current signal prior to detection
3 by the current detector.
- 1 49. The transceiver of claim 41, wherein the current detector detects the second
2 balanced current signal by sensing a change in a magnetic field surrounding the
3 transmission line.
- 1 50. The transceiver of claim 49, wherein the current detector is a magnetic field
2 sensor that includes giant magnetoresistive materials.
- 1 51. The transceiver of claim 41, wherein the transceiver determines that the
2 transmission line is active if current flow is detected through the transmission
3 line.

1 52. The transceiver of claim 41, wherein the transceiver determines that the
2 transmission line is inactive if no current flow is detected through the
3 transmission line.

1 53. A communications system comprising:
2 a transmission line;
3 a transmitter coupled to the transmission line, wherein the transmitter transmits a
4 digital signal on the transmission line by switching between a first power
5 source and a second power source to generate a transmitted signal and
6 wherein the transmitted signal is a balanced current signal; and
7 a receiver comprising a current detector, wherein the receiver is coupled to the
8 transmission line and wherein the receiver detects the transmitted signal
9 generated by the transmitter by sensing the current changes in the
10 transmission line using the current detector.

1 54. The communications system of claim 53, wherein the transmission line is a
2 twisted pair cable.

1 55. The communications system of claim 53, wherein the first power source
2 comprises a direct current voltage source.

1 56. The communications system of claim 55, wherein the second power source
2 comprises the direct current voltage source and a sinusoidal wave generator.

- 1 57. The communications system of claim 53, wherein the current detector detects the
2 transmitted signal by sensing a change in a magnetic field surrounding the
3 transmission line.
- 1 58. The communications system of claim 53, wherein the current detector is a
2 magnetic field sensor that includes giant magnetoresistive materials.
- 1 59. The communications system of claim 53, wherein the transmitter or receiver
2 determines that the transmission line is active if current flow is detected through
3 the transmission line.
- 1 60. The communications system of claim 53, wherein the transmitter or receiver
2 determines that the transmission line is inactive if no current flow is detected
3 through the transmission line.
- 1 61. A communications system comprising:
2 means for transmitting a balanced current signal on a twisted pair cable; and
3 means for receiving the balanced current signal by detecting a change in current
4 on the twisted pair cable.
- 1 62. The communications system of claim 61, wherein the means for transmitting a
2 balanced current signal comprises means for switching between two power
3 sources to generate a positive signal image and a negative signal image.

- 1 63. The communications system of claim 63, wherein the means for receiving the
2 balanced current signal comprises means for sensing a change in a magnetic field
3 surrounding the twisted pair cable.
- 1 64. A method comprising:
2 encoding a communication signal into a balanced current signal by switching
3 between a plurality of voltage potentials, wherein the communication
4 signal is comprised of a positive signal image and a negative signal image;
5 transmitting the current signal on a current loop; and
6 detecting the current signal by sensing a change in current through the current
7 loop.
- 1 65. The method of claim 64, wherein the plurality of voltage potentials is comprised
2 of a constant voltage potential and a sinusoidal voltage potential.
- 1 66. The method of claim 65, wherein the sinusoidal voltage potential is a sinusoidal
2 voltage that is offset by a constant voltage.
- 1 67. The method of claim 64, wherein the communication signal is a digital signal.
- 1 68. The method of claim 64, wherein the sensing the change in current comprises
2 sensing a change in a magnetic field surrounding the current loop.